

1. An article superior in making a waterdrop slip down a surface of the article, the article comprising:

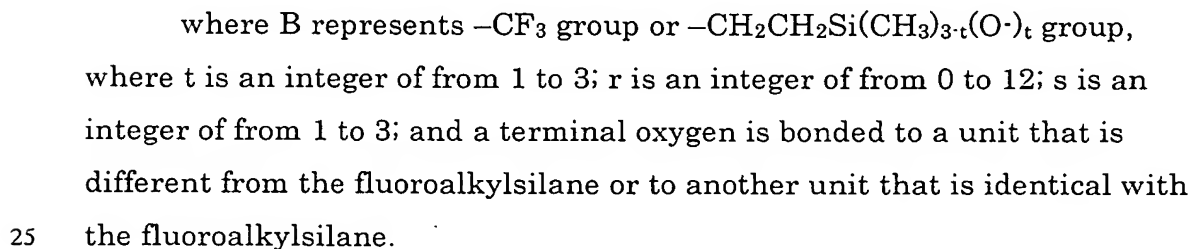
5 a functional film formed on a surface of the substrate, the functional
film comprising:

(b) a dimethyl silicone represented by the general formula [A], the

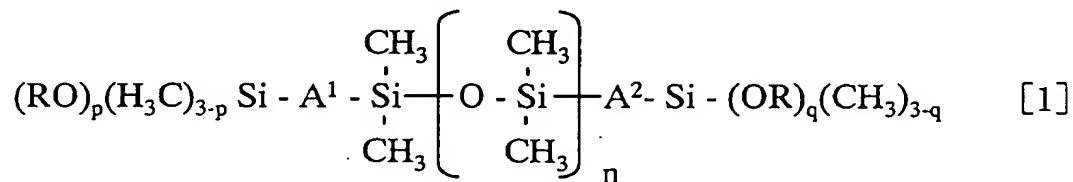
dimethyl silicone being in an amount of from 0.1wt% to 10wt%, based on a
10 total weight of the silica; and

$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{---}(\text{O})_p(\text{H}_3\text{C})_{3-p}\text{Si}-\text{A}^1-\text{Si}-\left[\text{O}-\text{Si}-\right]_n-\text{A}^2-\text{Si}-(\text{CH}_3)_{3-q}(\text{O}-)_q \quad [\text{A}] \\ | \\ \text{CH}_3 \end{array}$$

where each of A¹ and A² is independently a bivalent hydrocarbon group, -(CH₂)_i-NH-COO- group, where i is an integer of from 0 to 9, or oxygen; n is an integer of 2,000 or less and represents an average degree of polymerization; each of p and q is independently an integer of from 0 to 3; a total of p and q is 3 or greater; and each of terminal oxygens is independently bonded to a unit that is different from the dimethyl silicone or to another unit that is identical with the dimethyl silicone,



2. An article according to claim 1, wherein n is an integer of from 5 to 1,000.
3. An article according to claim 1, wherein the fluoroalkylsilane is in an amount of from 3wt% to 20wt%, based on the total weight of the silica.
4. An article according to claim 3, wherein the fluoroalkylsilane is in an amount of from 20 moles to 200 moles, per mol of the dimethyl silicone.
5. A process for using an article according to claim 1, comprising the step of wiping the functional film of the article with a windshield wiper, when the article is used as a vehicular windshield.
6. A process for producing an article superior in making a waterdrop slip down a surface of the article, the process comprising the steps of:
 - (a) mixing a silica precursor sol with (i) an alkoxy-group-terminated dimethyl silicone that is represented by the general formula [1] and that is in an amount of from 0.1wt% to 10wt%, based on a total weight of a silica that is to be produced from the silica precursor sol and (ii) a fluoroalkylsilane represented by the general formula [2], such that the alkoxy-group-terminated dimethyl silicone and the fluoroalkylsilane are subjected to hydrolysis and polycondensation to form a polycondensation product and such that a coating liquid containing a mixture of the silica precursor sol and the polycondensation product is prepared; and
 - (b) applying the coating liquid to a substrate,



where each of A¹ and A² is independently a bivalent hydrocarbon group,
-(CH₂)_i-NH-COO- group, where i is an integer of from 0 to 9, or oxygen; R is a
monovalent hydrocarbon group; n is an integer of 2,000 or less and represents
an average degree of polymerization; each of p and q is independently an
5 integer of from 0 to 3; and a total of p and q is 3 or greater,



where B represents -CF₃ group or -CH₂CH₂Si(CH₃)_{3-t}Y_t group, where
Y represents a hydrolysable group and t is an integer of from 1 to 3; X
represents a hydrolysable group; r is an integer of from 0 to 12; and s is an
10 integer of from 1 to 3.

7. A process according to claim 6, wherein a precursory film formed by
the step (b) is heated at a temperature of from 80°C to 600°C into a
functional film of the article.

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8. A process according to claim 6, wherein n of the general formula [1] is
from 5 to 1,000.

9. A process according to claim 6, wherein the fluoroalkylsilane of the
20 step (a) is in an amount of from 3wt% to 20wt%, based on the total weight of
the silica that is to be produced from the silica precursor sol.

10. A process according to claim 9, wherein the fluoroalkylsilane is in an
amount of from 20 moles to 200 moles, per mol of the dimethyl silicone.

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11. A process according to claim 6, wherein the silica precursor sol is
prepared by subjecting an alkoxysilane to hydrolysis and polycondensation.

12. A process according to claim 6, wherein the silica precursor sol contains water and an acid catalyst.

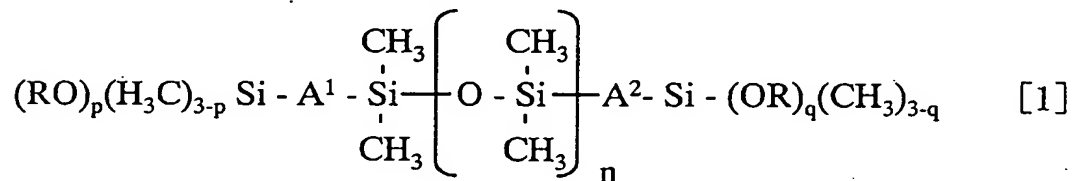
13. A process for producing an article superior in making a waterdrop slip
5 down a surface of the article, the process comprising the steps of:

(a) subjecting an alkoxysilane to hydrolysis and polycondensation, thereby preparing a silica precursor sol;

(b) subjecting an alkoxy-group-terminated dimethyl silicone represented by the general formula [1] and a fluoroalkylsilane represented by
10 the general formula [2] to hydrolysis and polycondensation, thereby preparing a polycondensation product;

(c) mixing the silica precursor sol with the polycondensation product, thereby preparing a coating liquid; and

(d) applying the coating liquid to a substrate,



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where each of A¹ and A² is independently a bivalent hydrocarbon group, -(CH₂)_i-NH-COO- group, where i is an integer of from 0 to 9, or oxygen; R is a monovalent hydrocarbon group; n is an integer of 2,000 or less and represents an average degree of polymerization; each of p and q is independently an
20 integer of from 0 to 3; and a total of p and q is 3 or greater,



where B represents -CF₃ group or -CH₂CH₂Si(CH₃)_{3-t}Y_t group, where Y represents a hydrolysable group and t is an integer of from 1 to 3; X represents a hydrolysable group; r is an integer of from 0 to 12; and s is an
25 integer of from 1 to 3.

14. A process according to claim 13, wherein a precursory film formed by the step (d) is heated at a temperature of from 80°C to 600°C into a functional film of the article.
- 5 15. A process according to claim 13, wherein n of the general formula [1] is from 5 to 1,000.
16. A process according to claim 13, wherein the fluoroalkylsilane is in an amount of from 3wt% to 20wt%, based on the total weight of the silica that is
10 to be produced from the silica precursor sol.
17. A process according to claim 16, wherein the fluoroalkylsilane is in an amount of from 20 moles to 200 moles, per mol of the dimethyl silicone.